

Appl. No. 10/722,004
Amdt. dated December 12, 2006
Reply to Office action of September 25, 2006

REMARKS

This Response and Amendment is filed in response to the Office Action dated September 25, 2006. Applicant amends claims 36 and 45 such claims 21-48 are pending in this application. Applicant graciously acknowledges the allowance of claims 21-35 and respectfully requests allowance of the remaining pending claims, claims 36-48.

In the Office action, claims 36-48 are rejected under 35 U.S.C. § 101 as directed to non-statutory subject matter. The Office contends that the final steps of analyzing in claim 36 and calculating in claim 45 are not sufficient to constitute a tangible result. Further, that (a) the outcomes of the analyzing and calculating steps are not being claimed in a disclosed practical application, and (b) the outcomes are not being made available in such a manner that its usefulness in a disclosed practical application can be realized.

In response to this rejection, claims 36 and 45 do recite a tangible result and set forth a practical application of a mathematical calculation to produce a real-world result. Claim 36 has been amended to recite a final step of "comparing the captured images with a datum point to determine positioning of the rail system," and claim 45 has been amended to recite a final step of "calculating a deviation of the center point with respect to the datum point."

A claimed invention is directed to a practical application when it (a) "transforms" an article or physical object to a different state or thing; or (b) otherwise produces a useful, concrete and tangible result. In making a determination as to whether a claim produces a useful, tangible, and concrete result, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete. Rather, the focus is on whether the final result achieved by the claimed invention is useful, tangible, and concrete. MPEP 2106 (IV.C.2). In determining whether the tangible requirement is met, the question is whether the process claim sets forth a practical application of a mathematical calculation to produce a real-world result. *Gottschalk v. Benson*, 409 U.S. 63, 71-72 (1972). The process claims 36 and 45 do produce a real-world result.

As set forth in *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F.3d 1368, 1374 (Fed. Cir. 1998), 35 U.S.C. § 101 has a broad scope.

The plain and unambiguous meaning of § 101 is that any invention falling within one of the four stated categories of statutory subject matter may be patented, provided it meets the other requirements for patentability set forth in Title 35, i.e., those found in §§ 102, 103, and 112, ¶2. (footnote omitted).

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The repetitive use of the expansive term "any" in § 101 shows Congress's intent not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in § 101. Indeed, the Supreme Court has acknowledged that Congress intended § 101 to extend to "anything under the sun that is made by man." *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980); see also *Diamond v. Diehr*, 450 U.S. 175, 182 (1981). Thus, it is improper to read limitations into § 101 on the subject matter that may be patented where the legislative history indicates that Congress clearly did not intend such limitations. See *Chakrabarty*, 447 U.S. at 308 ("We have also cautioned that courts 'should not read into the patent laws limitations and conditions which the legislature has not expressed.' (citations omitted)).

State Street at 1372-73. *State Street* goes on to cite examples of practical applications of mathematical algorithms, formulas and calculations applied to produce a useful, concrete and tangible result, which are listed below.

- In *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994), it was held that a data transformed by a machine through a series of mathematical calculations to produce a smooth waveform display on a rasterizer monitor constituted a practical application of an abstract idea because it produced a "useful, concrete and tangible results" – the smooth waveform.
- In *Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 958 F.2d 1053 (Fed. Cir. 1992), it was held that the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations constituted a practical application of an abstract idea because it corresponded to a useful, concrete or tangible thing – the condition of a patient's heart.
- In *State Street*, it was held that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application because it produces "a useful, concrete and tangible result" – a final share price momentarily fixed for recording and reporting purpose and even accepted and relied upon by regulatory authorities and in subsequent trades.

State Street at 1373.

Following the guidelines set forth in *State Street*, claims 36 and 45 set forth a transformation of data through a series of mathematical calculations that constitutes a practical

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application of an abstract idea that provides a useful, concrete and tangible result, i.e., a real-world result. As discussed above, the focus is on whether the final result achieved by the claimed invention is tangible, not whether a particular step achieves a tangible result. In the Office action, the Office focuses on the final steps of claims 36 and 45, rather than the final result set forth in the claim. In doing so, the entire claim is not analyzed to determine whether a practical application constitutes a useful, concrete and tangible result.

Referring to claim 36, the claim recites many steps for performing a runway survey on a rail system. The steps include:

- mounting a laser unit having a self-leveling laser on the rail system, the self-leveling laser including a level sensor positioned to determine a level condition of the laser, the level sensor generating a signal representative of the level condition of the laser;
- adjusting a level position of the laser using the signal generated by the level sensor;
- supporting a survey car on the rail system for movement along the rail system relative to the laser, the survey car including an image acquisition device and an encoder connected to a shaft of the survey car wherein movement of the shaft is representative of movement of the survey car relative to the laser;
- projecting a laser spot on the image acquisition device by emitting a laser beam from the laser when the laser is substantially level;
- capturing an image of the laser spot using the image acquisition device wherein the encoder triggers the image acquisition device to capture the image of the laser spot based upon a position of the survey car on the rail system relative to the laser;
- comparing the captured images with a datum point to determine positioning of the rail system.

The final result of this claimed invention is a determination of a position of the rail system, of which one step is comparing captured images of a laser spot with a datum point. This claim includes a transformation of data (i.e., captured images and datum point) through calculations into a position of the rail system, which constitutes a practical application of an abstract idea because the final result results in a useful, concrete and tangible, real-world result.

Referring to claim 45, the claim recites many steps for performing a runway survey on a rail system to determine whether adjustment of the rail system position is necessary. The steps include:

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- mounting a laser unit on the rail system, the laser unit including a laser;
- supporting a survey car on the rail system for movement along the rail system relative to the laser, the survey car including a screen and an image capturing device positioned to obtain an image of the screen;
- emitting a laser beam from the laser, the laser beam projecting a laser spot on the screen;
- capturing an image of the screen using the image capturing device, the image of the screen including an image of the laser spot;
- transmitting the captured image to a computer;
- analyzing the captured image to determine a center point of the captured image, the center point having an X dimension and a Y dimension;
- comparing the X and Y dimensions of the center point with a datum point; and
- calculating a deviation of the center point with respect to the datum point.

The final result of this claimed invention is a calculated deviation between a laser spot corresponding to a rail position and a datum point to determine whether adjustment of the rail system is necessary, of which one step is calculation of a deviation of a center point (of a captured image of the laser spot) with respect to a datum point. This claim includes a transformation of data (i.e., captured images and datum point) through calculations into a deviated position of the rail system, which constitutes a practical application of an abstract idea because the final result results in a useful, concrete and tangible, real-world result.

In the Office action, claims 45-48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,545,384 (Plasser et al.) in view of U.S. Patent No. 4,904,081 (Miyahara); claims 36-37 and 39-44 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Plasser et al. in view of Miyahara and U.S. Patent No. 6,314,650 (Flab); and claim 38 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Plasser et al. in view of Miyahara, Falb, and U.S. Patent No. 6,415,208 (Pojda).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q. 2d 1438, 1442 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. *Id.* Finally, the prior art

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reference (or references when combined) must teach or suggest all of the claim limitations. *In re Royka*, 490 F.2d 981, 985, 180 U.S.P.Q. 580, 583 (CCPA 1974); MPEP §§706.02(j), 2143.03.

Independent claim 45 recites a method of performing a runway survey on a rail system to determine whether adjustment of the rail system is necessary, the method including mounting a laser unit, including a laser, on the rail system; supporting a survey car on the rail system for movement along the rail system relative to the laser, the survey car including a screen and an image capturing device positioned to obtain an image of the screen; emitting a laser beam from the laser, the laser beam projecting a laser spot on the screen; capturing an image of the screen using the image capturing device, the image of the screen including an image of the laser spot; transmitting the captured image to a computer; analyzing the captured image to determine a center point of the captured image, the center point having an X dimension and a Y dimension; comparing the X and Y dimensions of the center point with a datum point; and calculating a deviation of the center point with respect to the datum point.

Plasser et al. and Miyahara, alone or in combination, do not teach or suggest the subject matter defined by independent claim 45.

Neither Plasser et al. nor Miyahara teach or suggest at least three steps of claim 45: analyzing a captured image to determine a center point of the captured image, the center point having an X dimension and a Y dimension; comparing the X and Y dimensions; and calculating a deviation of the center point with respect to the datum point. Although Miyahara discloses using an arithmetic processing unit for calculating a deviation of a laser spot and determining curvature of a rail, the cited reference does not teach or suggest the particular steps set forth in claim 45. Further, the Examiner has not provided any references that teach the analyzing, comparing or calculating steps.

Therefore, because the cited prior art does not teach or suggest performing a runway survey to determine whether adjustment of the rail system position is necessary that at least includes determining a center point of the captured image, assigning an X dimension and a Y dimension to the center point, comparing the X and Y dimension of the center point with a datum point, and calculating a deviation of the center point with respect to the datum point.

Finally, Miyahara teaches away from combining with Plasser et al. because the subjective and objective cylinders are connected together. Plasser et al. teaches a machine frame 1 supporting a receiver 20 movable along a track relative to a bogie supporting a sender 18.

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Although the unit may move along a track, the objective cylinder does not move relative to the subjective cylinder.

Accordingly, independent claim 45 is allowable. Dependent claims 46-48 depend from independent claim 45 and are allowable for the same and other reasons.

Independent claim 36 recites a method for performing a runway survey on a rail system. The method includes mounting a laser unit having a self-leveling laser on the rail system; adjusting a level position of the laser using the signal generated by the level sensor; supporting a survey car on the rail system for movement along the rail system relative to the laser, the survey car including an image acquisition device and an encoder connected to a shaft of the survey car wherein movement of the shaft is representative of movement of the survey car relative to the laser; projecting a laser spot on the image acquisition device by emitting a laser beam from the laser when the laser is substantially level; capturing an image of the laser spot using the image acquisition device wherein the encoder triggers the image acquisition device to capture the image of the laser spot based upon a position of the survey car on the rail system relative to the laser; and comparing the captured images with a datum point to determine positioning of the rail system.

Plasser et al., Miyahara and Falb, alone or in combination, do not teach or suggest the subject matter defined by independent claim 36. The cited prior art does not teach or suggest at least two elements of the claim, the survey car including an encoder connected to a shaft of the survey car wherein movement of the shaft is representative of movement of the survey car relative to the laser and the encoder triggering the image acquisition device to capture the image of the laser spot based upon a position of the survey car on the rail system relative to the laser. Accordingly, independent claim 36 is allowable. Dependent claims 37-44 depend from independent claim 36 and are allowable for the same and other reasons.

Applicant notes the Examiner's official notice related to centroid measurement, which is recited in dependent claims 39 and 46. In page 4 of the Office action, the Examiner takes official notice that centroid analysis is a well-known technique. Applicant will traverse the use of official notice by the Examiner with respect to the fact that centroid analysis is known; however, Applicant will not traverse anything beyond the previous statement. Applicants remind the Examiner that claims 39 and 46 depend from claims 36 and 45, respectively, and therefore, the limitations of claims 39 and 46 cannot be read in a vacuum. There is no indication in the cited

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references, that a centroidal analysis can be used in a survey system or for analysis of the position of a light spot. If the Examiner disagrees otherwise, then Applicant requests the Office to support its assertion.

In view of the amendments presented herein, Applicant believes that the claims as filed are in condition for allowance and respectfully requests a timely Notice of Allowance be issued for this case. Applicant kindly requests that the Examiner telephone the attorney of record in the event a telephone discussion would be helpful in advancing the prosecution of the present application.

Respectfully submitted,



Gayle A. Bush
Reg. No. 52,677

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Michael Best & Friedrich LLP
100 East Wisconsin Avenue
Suite 3300
Milwaukee, Wisconsin 53202-4108
414.271.6560